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Zygænidæ and Bombycidæ, and now we have an admirably prepared list of the next extensive family, the Noctuidæ. No other list has been published since the imperfect one contained in Dr. Morris' Catalogue of our Lepidoptera published by the Smithsonian Institution in 1860.

The species enumerated by Mr. Grote amount to 815, belonging to 282 genera, including the Deltoids (Hypena and allies) which the author, following Lederer, takes out of the Pyralidæ. Though it is not stated in the preface, the list is evidently restricted to that part of the continent north of the West Indies and Mexico. The most important synonyms are given, with an index to the genera. The appendix contains a number of new genera and species, illustrated in part by an excellent plate. The distribution of the genera is given ; we wish that the localities of all the species separately could have been added.

BOTANY.

GEOGRAPHICAL DISTRIBUTION OF THE CUPULIFERÆ.—This large family, including the chestnuts, oaks, and beeches, since it is the earliest geologically of the dicotyledonous plants, affords much promise of definite conclusions in regard to the genetic relations of the present species from a comparison of the living and fossil forms. The first results of an extended investigation in this direction, by A. S. Orsted, in which the morphology, classification and geographical distribution of the family, are treated has been published in the transactions of the Copenhagen Academy. The conclusions in regard to geographical distribution harmonize with the generally received law, that the more the classification of a family rests on characteristics which indicate a real relationship, the clearer it appears, that each subdivision has its own centre of distribution, and further that the greater the differences of organization between the subdivisions, the greater the geographical distances between these centres. Thus the chestnuts, oaks and beeches, constituting the three groups of this family, afford three principal centres of distribution, and cover three large, widely separated geographical regions ; the chestnuts having their centre in the Malay islands, the oaks in Mexico, and the beeches in South America. The chestnut group, which is sharply separated from the other groups, also has its own peculiar, tolerably well defined region, manifesting its greatest diversity of form, and its purest types on the Malay islands, especially on Java and Sumatra, where its proper centre lies. But one species passes its boundaries toward the west, and plays an important part around the Mediterranean, and three species are found in America, whilst the typical genus is found exclusively on the Malay islands, where only a few species of chestnut-oak are found, and not a single true oak. In a similar manner the oak group occurs chiefly in America, north of the equator, forming a second centre of distribution in the mountains of Mexico, where it manifests not only more numerous species but also greater diversity of organization, than anywhere else, several large subdivisions being found that are not met with elsewhere, whilst chestnuts and beeches are entirely wanting. Although the beech group exhibits such a preponderance of species in Chili, that that country must be regarded as its proper home, still the species are so scattered that it is difficult, with the present distribution of land and water, to refer all to a single centre. This difficulty is not so great, however, in regard to *Nothofagus*, which occurs in New Zealand and Van Dieman's Land, since there are other grounds for assuming that these were at one period connected with Chili. Still it seems impossible to refer the species of *Fagus* to the same centre, since the nearest related species is separated by 70° of latitude from the beeches of the south, so that, paradoxical as it may appear, Japan seems once to have formed the connection between the beeches of the north and south, just as we find points of contact between Chili and Japan in other respects. An explanation of this is afforded by the fact that the beeches of Japan conform to those of the Miocene epoch; the centre of distribution of the typical beeches must therefore be sought in a past geological period, and from it they must have been dispersed in different directions, before the present distribution of land and water. Besides the three principal centres alluded to, there are also three secondary centres of distribution characterized by peculiar genera and sub-genera. The principal groups in passing beyond their respective regions, and mingling with each other have produced regions of transition, in which forms appear which are the connecting links between the types from the different centres. Various facts in regard to the distribution of plants in general are also peculiarly illustrated by this family. Thus it exhibits most clearly the marked difference between the floras of Mexico and the Antilles, the oaks being more numerous in Mexico than any other portion of the world, whilst they are wholly wanting in the Antilles, although the latter afford climatic conditions favorable to their growth in many places. This contrast, can be partially explained, as regards the oaks, by the fact that the seeds of the latter soon lose their power of germination, and are not easily transported by currents; and besides the oaks occur in the mountainous regions of Mexico, remote from the sea, and even if the seeds were transported by the aid of rivers, they would not find conditions favorable to their development on the coast of the Antilles, a fact in harmony with the general rule, that the larger number of the plants common to the Antilles and the continent belong to the lowlands of the tropics, whilst the plants of the mountains are generally endemic. The distribution of the cupuliferæ also substantiates, in a remarkable manner, the general rule that the floras richest in endemic species are those where the physical obstructions to diffusion of plants are greatest, the ocean, high snow-covered mountain ranges, especially those with their axes perpendicular to the direction of the wind, forming sharply defined limits of floras. Thus whilst the white oak occurs all over Europe, the species of cupuliferæ in Sumatra and Java are entirely different from each other. In like manner the characteristic cupuliferæ of California are restricted to the western slope of the Nevada chain, and the beeches of Chili are entirely excluded from the east side of the snow-covered Cordilleras. This family also manifests the usual anomalies to the general rule, that the zone of vegetation becomes more elevated near the equator, caused by peculiarities in the form of the mountains, and the influence of clouds, a high plateau, with stronger insolation, producing a considerable elevation of the zone and the snow line, as in Bolivia, and Thibet, whilst abrupt, isolated peaks have a reverse effect. Thus Europe exhibits the influence of plateaus upon the cupuliferæ in two points, namely in the central part of the Alps, in the weaker development and the lowering of the zone of the beeches, whilst the pine and larch, to which a mountainous climate is very favorable, form a broad zone in Wallis and Granbünden, 500 to 1000 feet higher than in the Bavarian Alps. Again the chestnut zone, which reaches 5,000 feet on the Sierra Nevadas, which rest on the plateau of Grenada, does not rise above 3,200 feet in the same latitude, in Portugal. This is owing, it is true, in part to peculiar climatic conditions, which produce an unusual depression of the zones in Portugal, and which also manifest themselves in rendering the zone of vegetation much lower in Sumatra than in Java, on acccount of the difference in insolation, caused by the more frequent and heavier clouds in Sumatra, where the axis of the mountains is perpendicular to the course of the moist, prevailing winds, whilst in Java it is parallel to it. In this respect Portugal resembles Sumatra, and nowhere are the effects of similar climatic conditions more evident than in the southern portions of Chili, and in Terra del Fuego.

NOTE ON THE INFLUENCE OF LIGHT ON THE DEVELOPMENT OF PLANTS.—Last summer a *Mentychia ornata*, about a fortnight before commencing to bloom, was prostrated by a storm and remained in that position for a week before I restored it to its upright position. The inflorescence of Mentychia is centrifugal, the terminal flower opening first and the rest in their order downward, each flower opening in the evening and closing before sunrise, reopening on a second and usually on a third evening. In this instance the regular order was disturbed, the second flower not opening till after the fourth, then the fifth to the eighth in order, then the twelfth followed by the eleventh, ninth and tenth, then the thirteenth followed by the sixteenth, fourteenth and fifteenth. All the retarded flowers were on the lower side of the prostrate plant, the retardation being the consequence of the diminished exposure to light during one week.—FRED. BRENDEL.

ZOOLOGY.

THE STRUCTURE OF SPONGES.—An exceedingly valuable work on the calcareous sponges has lately been published by Professor Haeckel. An increased interest in these organisms has been felt from their frequent occurrence at great depths in the sea, the various dredging expeditions in the north Atlantic and the Mediterranean having revealed many new forms of the silicious, or glass sponges and their allies. Of the animal nature of sponges but few naturalists doubt. Carter, an English microscopist believed that the sponge was an aggregation of Amœba-like infusoria, living among a framework of silicious or limestone spicules. A little later, the lamented Professor H. J. Clark, of this country published, in 1866, a paper in which he maintained that the sponge